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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|--------------------------------|-------------|----------------------|---------------------|------------------|
| 10/696,049 | 10/29/2003 | Heping Dai | TI-36527 | 5830 |
| 23494 | 7590 | 12/16/2004 | EXAMINER | |
| TEXAS INSTRUMENTS INCORPORATED | | | KITOV, ZEEV | |
| P O BOX 655474, M/S 3999 | | | | |
| DALLAS, TX 75265 | | | ART UNIT | PAPER NUMBER |
| | | | 2836 | |

DATE MAILED: 12/16/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | |
|------------------------------|------------------------|------------------|--|
| Office Action Summary | Application No. | Applicant(s) | |
| | 10/696,049 | DAI ET AL. | |
| | Examiner Zeev Kitov | Art Unit 2836 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) Responsive to communication(s) filed on 27 September 2004.

2a) This action is **FINAL**. 2b) This action is non-final.

3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) Claim(s) 1 - 20 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) Claim(s) _____ is/are allowed.

6) Claim(s) 1 - 20 is/are rejected.

7) Claim(s) _____ is/are objected to.

8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) The specification is objected to by the Examiner.

10) The drawing(s) filed on 23 April 2004 is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) All b) Some * c) None of:

1. Certified copies of the priority documents have been received.

2. Certified copies of the priority documents have been received in Application No. _____.

3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) Notice of References Cited (PTO-892)

2) Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____

4) Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____

5) Notice of Informal Patent Application (PTO-152)

6) Other: _____

DETAILED ACTION

Examiner acknowledges a submission of the amendment and arguments filed on September 27, 2004. Claims 1 and 11 are amended. Amendment and Arguments overcome rejection under 35 USC 112, 2nd paragraph. However, Applicant's Arguments regarding rejections under 35 USC 103 have been found non-persuasive. The rejection follows.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 2, 4, 7, 9 - 12, 14, 17, 19, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Smith et al. (US 6,014,030) in view of Ogasawara (US 5,001,928). Regarding Claims 1 and 11, Smith et al. disclose most of the elements of the claims including a switch (elements M103, M104 in Fig.4b) connected to the power supply and a load; a control circuit (elements 115, 116, 109 in Fig. 4b) connected to the power supply source (element 101 in Fig. 4b) and to the load side of the switch (terminal 118 in Fig. 4b), wherein the control circuit monitors the voltage across the switch and limits the current through the switch when exceeding a current limit set by the reference elements (elements 113, 114, 107 in Fig. 4b, col. 7, lines 33 – 40).

However, it does not disclose the shunt resistor connected to the control circuit.

Ogasawara discloses the shunt resistor (element R_d in Fig. 1) connected to the input of the operational amplifier (element OP_1 in Fig. 1) analogues to the operational amplifiers (elements 115, 116 and 109 in Fig. 4b of Smith). This resistor is to be connected in series with the operational amplifier input, i.e. to the supply node (element 121 in Fig. 4b of Smith et al.). Then changing a value of the shunt resistor would affect the threshold of the switch activation satisfying the following claim limitation: "a current limit set by the shunt resistance as determined by the voltage at the shunt resistor and the voltage at the switch". Both references have the same problem solving area, namely providing temperature compensation to the electronic equipment. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the Smith et al. solution by adding the shunt resistance according to Ogasawara, because as Smith et al. state col. 10 – line 20 – col. 11, line 43), for precision operation of the circuit the temperature dependence of the switching threshold should be compensated.

Regarding Claims 2, 4, 12 and 14 as one can see, the only way to connect the additional shunt resistor to the circuit of Fig. 4b of Smith et al. is to the supply side of the switch (to the node 121 in Fig. 4b of Smith et al.), which is the low side of the supply. As to motivation for modification of the primary reference, see above.

Regarding Claims 7 and 17, Smith et al. disclose N-channel FET transistor (elements M103 and M104 in Fig. 4b).

Regarding Claims 9, 10, 19 and 20, Smith discloses the circuit incorporated in an integrated circuit (element 10 in Fig. 3). In modern design practice it is widely used to incorporate all circuit elements (except some, which is difficult to integrate) into integrated circuit package. The shunt resistor should be integrated because it should be placed as close as possible to the switching transistors for better sensing their temperature; the adjustment resistor should not be integrated because otherwise setting the value of the resistor would be possible. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have further modified the Smith et al. solution by incorporating most of the electronic components, except the shunt resistor and adjustment resistor, into the integrated circuit because as well known in the art, the integration would bring some substantial advantages, such as saving the space, increase in reliability and saving an assembly cost.

Claims 3 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Smith et al. in view of Ogasawara and Court Decision *In re Japikse*, 181 F.2d 1019, 86 USPQ 70 (CCPA 1950). As was stated above, Smith et al. and Ogasawara disclose all the elements of Claims 1 and 11. However, regarding Claims 3 and 13, they do not disclose the first terminal of the resistor being connected to the load side of the switch, rather than to the battery side of the switch. A criticality of the shunt resistor connection near the load side of the switch was not disclosed. Being on either side of the switch it would perform the same way. The Court Decision stating that rearranging parts of an invention involves only routine skill in the art addressed this issue. Therefore, it would

have been obvious to one of ordinary skill in the art at the time the invention was made to have further modified the Smith et al. solution by moving the shunt resistor connection from the battery side of the switch to the load side of the switch, since it has been held that rearranging parts of an invention involves only routine skill in the art.

Claims 3, 5, 6, 8, 13, 15, 16 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Smith et al. in view of Ogasawara and A. Sedra et al. textbook Microelectronic Circuits. As was stated above, Smith et al. and Ogasawara disclose all the elements of Claims 1 and 11. However, regarding Claims 5, 8 and 15 and 18, they do not disclose a P-channel FET transistor and the switch being connected to the high side of the supply. A. Sedra et al. textbook Microelectronic Circuits discloses N-channel and P-channel MOSFET's as being complementary quite similar elements but having complementary polarity (pages 342 – 345). As shown in Recapitulation (Fig. 7.17, page 345), the P-channel and N-channel MOSFET's are mutually replaceable with some minor circuit adjustment. Selection of particular device for design is a routine task for designer. Therefore the P-channel MOSFET with a change of the battery terminals polarity can replace the N-channel MOSFET device of Smith et al. As a result, the switch will be connected to the high side of the power supply. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have further modified the Smith et al. solution by changing the N-channel MOSFET to the P-channel MOSFET and reversing connection of the battery terminals, because as Sedra et al. textbook shows the N-channel and P-channel MOSFET's are substantially

equivalent devices different only by their polarity and designer selects a particular type of the device according to his convenience.

Regarding Claims 6 and 16, Smith et al. disclose the current source as a linear temperature dependent source (Fig. 5a, col. 10, line 20 – col. 11, line 43). Ogasawara discloses a current source (element 1 in Fig. 1) that sets a bias voltage drop across the shunt resistor (element Rd in Fig. 1). In the Smith et al. system modified according to Ogasawara the current source will fulfill its role stated by Smith et al., i.e. compensating for variation of switch on resistance (RDS(on)) versus temperature. An evidence for that is that resistor Rf (Fig. 3) later shown as element 102 (Fig. 5a), which is temperature dependent and requires the temperature compensation, includes the RDS(on) (col. 5, lines 13 – 19).

Response to Arguments

1. Applicant attempts to disqualify the Smith reference claiming that the reference is in a different field of endeavor, i.e. it discloses the battery protection circuit, rather than current limiting circuit of instant invention (page 6, 4th paragraph). In response to Applicant's argument, it has been held that the determination that a reference is from a nonanalogous art is twofold. First, we decide if the reference is within the field of the inventor's endeavor. If it is not, we proceed to determine whether the reference is reasonably pertinent to the particular problem with which the inventor is involved. *In re*

Wood, 202 USPQ 171, 174. In this case, both the Application and the Smith reference resolve the same problem, i.e. protection of electronic equipment against overcurrents. As to Ogasawara reference, this reference is combinable with the primary reference of Smith, because both references have the same problem solving area, namely providing temperature compensation to the electronic equipment.

2. According to Applicant (page 6, 4th paragraph – page 7, 1st paragraph), “turning current completely on or completely off”, as disclosed in the reference, is different from way of functioning of the invented circuit, which “operates to limit current flow to a predetermined maximum through a switch”. However, conventional interpretation of the term “switch” recited in the Claim is associated with the on/of action. According to the Authoritative Dictionary of IEEE Standard Terms, the *switch* is “A device used to break or open an electric circuit or to divert current from one conductor to another”, i.e. it is device acting in on/off manner. Therefore, disconnecting the circuit when the current reaches a predetermined maximum value is an action, which is in exact compliance with a recited functional limitation, i.e., “operates to limit current flow to a predetermined maximum through a switch”. According to MPEP, analyzing the Claim elements Examiner should apply “broadest reasonable interpretation”.

According to Applicant, “This difference underlines the difference in what Smith et al. disclose from this important aspect of the invention” (page 7, paragraph 1).

Although the embodiment shown in Fig. 4 of Application may function in analogous fashion, and Specification provides some support to the Applicant’s position,

these aspects were not claimed explicitly. If Applicant's goal is to claim an analog control element, rather than the on/off switch, it should be explicitly ~~stated~~ in the Claim.

3. Applicant consistently throughout the whole section of Remarks implements the piecemeal analysis attacking the references individually on the basis that individual references used in 103 rejections do not disclose all elements of the Claims. In response to Applicant's piecemeal analysis of the references, it has been held that one cannot show non-obviousness by attacking references individually where, as here, the rejections are based on combination of references. *In re Keller*, 208 USPQ 871 (CCPA 1981).

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Zeev Kitov whose current telephone number is (571) 272 - 2052. The examiner can normally be reached on 8:00 – 4:30. If attempts to reach examiner by telephone are unsuccessful, the examiner's supervisor, Brian Sircus can be reached on (571) 272 – 2800, Ext. 36. The fax phone number for organization where this application or proceedings is assigned is (703) 872-9306 for all communications.

Z.K.
12/07/2004



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